WHAT IS CLAIMED IS:

1. A method for color-calibrating a printing device; said method comprising the steps of:

using the printing device to print a gray ramp with black ink;

using the same said printing device to print a nominally gray ramp with composite-black ink;

measuring and comparing the printed gray ramps; and

employing the measured black-ink ramp as a standard to correct the measured composite-black ramp.

2. The method of claim 1, wherein:

all the steps are performed automatically.

3. The method of claim 1, wherein:

the employing step comprises treating the black-ink ramp as a zero-chroma standard to correct chroma found in the composite-black ramp.

4. The method of claim 1, further comprising the step of:

using the compared black-ink and composite-black ramps to also correct other printing with composite black.

5. The method of claim 4, further comprising the step of:

using the compared black-ink and composite-black ramps to also correct other colors to be printed by the printer.

6. The method of claim 1, wherein:

the using step with composite-black ink comprises printing, for a particular gray tonal level, plural combinations of nonblack inks.

7. The method of claim 6, wherein:

the plural combinations of nonblack inks substantially bracket nominal values for the particular gray value.

8. The method of claim 7, wherein the employing step comprises:

searching the printed and measured plural combinations of nonblack inks to find a combination that is nearest the corresponding particular gray value.

9. The method of claim 7, wherein the employing step comprises:

searching the printed and measured plural combinations of nonblack inks to find at least two combinations that bracket a corresponding particular gray value; and

interpolating among the at least two combinations to determine an optimal combination for matching the corresponding particular gray value.

10. The method of claim 7, wherein said printing with plural combinations of nonblack inks comprises:

optimized bracketing of the nominal values.

11. The method of claim 10, wherein:

said optimized bracketing comprises printing with said plural combinations of nonblack inks that surround the nominal value in a pattern, in color space, that is substantially centered on the nominal value.

12. The method of claim 6, wherein the employing step comprises:

searching the printed and measured plural combinations of nonblack inks to find a combination that is nearest a corresponding particular gray value.

13. The method of claim 1, wherein:

the measuring and comparing step comprises inserting measured values of the printed gray ramps into equations representing a colorimetric model of the printer; and

the employing step comprises solving the equations to derive correction values for use in adjusting ink signals in future printing.

14. The method of claim 13, wherein:

the colorimetric equations include plural expressions having the form:

$$H(t,n,a) = D(t,n)\cdot E(t,n)\cdot \ldots \cdot F(t,n),$$

wherein H is a hybrid color printed by use of at least two constituent colors,

D is one of the constituent colors,

E is another of the constituent colors,

". . ." represents possible additional constituent colors of said at least two,

F is a correction factor,

t is a tonal level at which H, D, E and ". . ." are evaluated,

n is a sensor channel at which all the above are evaluated, and

a is a scaling factor that relates overall range of the hybrid color with overall range of the constituent colors.

15. The method of claim 14, wherein:

in some of the expressions, H = cK, D = S_1 and E = S_2, where cK is composite black and S_1 and S_2 are secondaries; and

in others of the expressions, H = S, D = P_1 and E = P_2, where S is a secondary and P_1 and P_2 are primaries.

16. The method of claim 15, wherein:

in said others of the expressions a = 1.

17. The method of claim 13, wherein:
the equations are solved by iteration.

18. A self-calibrating color printer comprising:
means for printing a nominally gray ramp using composite black;
means for measuring the printed ramp in at least two different spectral bands respectively; and
a programmed processor for modifying subsequent operation of the printer to substantially compensate for any nonzero chroma in said printed nominally gray ramp.

19. The printer of claim 18, wherein:
said measuring means comprise means for measuring the printed ramp in at least three different spectral bands.

20. The printer of claim 18, wherein said measuring means comprise:
at least two different lamps for illuminating the printed ramp; and
at least one sensor for detecting lamp illumination reflected from the printed ramp.

21. The printer of claim 20, wherein:
the at least two different lamps are light-emitting diodes, emitting different colors respectively.

22. The printer of claim 18, wherein said measuring means comprise:

means for illuminating the printed ramp in at least two spectral bands; and

at least one sensor for detecting illumination reflected from the printed ramp in the at least two spectral bands separately.

23. The printer of claim 22, wherein:

the illuminating means comprise a lamp emitting in the at least two spectral bands; and

the sensor comprises spatially, temporally or absorptively selective means for separating illumination from the at least two spectral bands.

24. The printer of claim 18, wherein:

the programmed processor comprises compensation means for adjusting subsequent operation to substantially minimize chroma in printing of nominal gray.

25. The printer of claim 24, wherein:

the compensation means comprise means for reducing chroma, in printing of nominal gray, to ΔE of approximately 2.5 or less; and

the notation ΔE represents the color distance in the CIEL*a*b* space.

26. A method for automatically color-calibrating a printer; said method comprising the steps of:

using the printer to print a ramp in a particular color with actual ink of that color;

using the same said printer to print a ramp nominally in said particular color but with inks of other colors;

measuring and comparing the printed ramps; and

using the measured actual-ink ramp as a standard to calibrate and correct the measured other-colors-ink ramp and also to correct other printing with said other colors.

27. The printer of claim 26, wherein:

said actual ink is selected from the group consisting of:

red ink,
green ink, and
blue ink;

and said inks of other colors are selected from the group consisting of, respectively:

magenta ink and yellow ink,
yellow ink and cyan ink, and
cyan ink and magenta ink.

28. A method for automatically color-calibrating a printer; said method comprising the steps of:

modeling an actual color-reproduction system of the printer in a color space that is transformed by contraction to bring machine-primary color axes closer to neutral gray;

performing a color calibration in the contracted model of the printer color-reproduction system; and

applying a reverse transform to expand calibration results to the actual color-reproduction system of the printer.